Yurok Tribe

Fall Chinook Age Composition

Final Report

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INTRODUCTION

The Klamath-Trinity age composition project estimates the numbers of fall chinook of each age class that enter the river in a given year. These numbers are used in predicting the run size of fall chinook for the next year, which in turn is used to set seasons and harvest quotas for the fisheries that target Klamath fall chinook.

The Klamath Basin age composition project has been a joint venture between the Yurok Tribe and the U.S. Fish and Wildlife Service (USFWS) since 1997. The Yurok Tribe was responsible for scale analysis for the Klamath Basin, excluding the Trinity River, which is handled by the Hoopa Valley Tribe. The U.S. Fish and Wildlife Service provided assistance to the Yurok Tribe, supplying an experienced scale reader.

METHODS

Scales used in the age composition project were collected during creel surveys, Indian net fishery monitoring, and spawning surveys in the river and tributaries, as well as from Iron Gate Hatchery (IGH). Yurok Tribal Fisheries Program (YTFP) personnel mounted the scales, ridged side up, on adhesive cards at 20 fish per card, 3 to 4 scales per fish. Mounted scales were then pressed into a sheet of acetate for ageing. The acetate impressions were examined using a microfiche machine. Scales were aged twice independently. A third aging was used as needed to resolve any discrepancies between the two primary readers. Scales that could not be satisfactorily aged were not used for the project.

Scale samples from known-age coded wire tagged (CWT) fish were aged to determine error associated with the Klamath River aging project. These scales were distributed throughout the Klamath Basin project, in an attempt to reflect error throughout the aging process. Reader error was adjusted for bias using a maximum likelihood estimator described by Kimura and Chikuni (1987). Known age scales from all areas were combined into a single correction matrix. The correction was applied to aged scales from each area, using only those scales that were not from CWT fish. The corrected proportions were then applied to the total unknown age fish (total fish minus known age fish) from the Megatable (CDFG 2001). Known age fish were then added back in to determine the proportions for each age in each area of the Megatable.

As in recent years, the method of determining the two-year-old (jack) proportion of the run varied from area to area. In some cases, the proportion determined by aging the scales was used. In other cases, the number of jacks given in the Megatable (CDFG 2001) was used. The Megatable jacks were generally estimated using a fork-length cutoff determined by looking for a nadir in the length frequency distribution. A third method was used for the first time this year, in which the appropriate fork-length cutoff was determined by the Klamath River Technical Advisory Team based on the aged scales and length frequency distributions. This cutoff was then used to determine the proportion of jacks. In the latter two methods, adult fish maintained their relative proportions from the age composition project (corrected as described above), which were applied to the adult proportion of that area's run.

In fisheries and areas where an insufficient number of scales were collected, areas that were

believed to best represent the under-sampled areas were used as surrogates. In previous years, the age compositions of the surrogate areas were weighted according to their escapements. Surrogates were modified this year, and most were not weighted. Areas where surrogates were used are labeled in Table 1.

RESULTS

A total of 8,286 scale samples from the Klamath Basin were examined to estimate age composition for the total in-river run. Of these, 414 were known-age fish. A total of 932 additional scale samples were unusable due to scale re-absorption, regeneration, missing scales, or inconclusive age estimates. Of the Klamath Basin known-age scales aged, 100.0% (n=28) of the age 2 fish were correctly aged, 96.1% (n= 307) of the age 3 fish were correctly aged, 69.9% (n=73) of the age 4 fish were correctly aged and 66.7% (n=6) of the age 5 fish were aged correctly.

Two-year-old fish (jack) proportions were determined separately for each area in the Klamath Basin, based on examination of fork-length frequency distributions and sampling methodology. For the Salmon and Scott Rivers, IGH, the Yurok net fisheries, and the upper river creel, a fork-length cutoff of < 58 cm was determined to be appropriate, and the jack proportion calculated by applying that cutoff to the length frequency distributions from each of those areas. For the lower river creel, the jack proportions given in the Megatable were used. In each of these areas, the proportion of fish belonging to age classes 3, 4, and 5 was adjusted so that the sum of all ages totaled 100%. The remaining two areas, Bogus Creek and Shasta River, used the scale proportions for all ages.

Results were combined with the results from the age composition project for the Trinity River Basin in Tables 1 and 2. The final results for the 2001 Klamath River Basin in-river age composition are as follows (Table 2):

2 year olds, brood year 1998	(4.5%)
3 year olds, brood year 1997	(82.0%)
4 year olds, brood year 1996	(13.3%)
5 year olds, brood year 1995	(0.2%)

Table 1. Age Composition of the 2000 Klamath River fall chinook run using scale analysis to determine age proportions except as noted.

Surrogate Scale Samples Utilized		AGE 2	3	4	5	Total Adults	Total
	SPAWNER ESCAPEMENT						
	Hatchery Spawners						
[1]	Iron Gate Hatchery (IGH)	839	63,594	7,910	131	71,635	72,474
	Trinity River (TRH)	1,071	24,050	1,923	5	25,978	27,049
	Subtotals	**1,910**	**87,644**	**9,833**	**136**	**97,613**	**99,523**
	Natural Spawners						
[2]	Trinity River basin (above Willow Creek, excluding TRH)	3,395	20,262	3,042	0	23,304	26,699
[1]	Salmon River basin	228	1,102	421	21	1,544	1,772
[1]	Scott River basin	524	4,701	1,028	0	5,729	6,253
	Shasta River Basin	1,271	7,584	3,442	0	11,025	12,296
	Bogus Creek Basin	373	31,207	3,390	80	34,678	35,051
IBSS [3]	Main Stem Klamath River (excluding IGH)	184	2,702	566	3	3,271	3,455
TRBN [4]	Trinity Tributaries above Reservation	103	614	92	0	706	809
SSS [5]	Klamath Tributaries above Reservation	158	997	341	6	1,345	1,503
TRBN [4]	Hoopa Reservation Tributaries	24	144	22	0	166	190
Salmon [6]	Yurok Reservation Tributaries	152	554	211	11	776	928
	Subtotals	**6,412**	**69,868**	**12,555**	**121**	**82,544**	**88,956**
	Total Spawner Escapement	**8,321**	**157,513**	**22,388**	**257**	**180,158**	**188,479**
	IN-RIVER HARVEST						
	Angler Harvest						
LR Creel [7]	Klamath River (below Hwy 101 bridge)	108	1,119	70	1	1,190	1,298
LR Creel [7]	Klamath River (Hwy 101 to Coon Cr. Falls)	972	946	60	1	1,006	1,978
UR Creel [8]	Klamath River (Coon Cr. Falls to IGH)	117	1,333	216	0	1,549	1,666
[9]	Trinity River basin (above WCW)	108	909	190	0	1,099	1,207
[9]	Trinity River basin (below WCW)	214	408	85	0	493	707
	Subtotals	**1,519**	**4,714**	**621**	**2**	**5,337**	**6,856**
	Indian Net Harvest						
[1]	Klamath River(below Hwy 101)	35	12,626	4,509	143	17,278	17,313
[1]	Klamath River(Hwy 101 to Trinity mouth)	140	4,884	1,229	62	6,175	6,315
	Trinity River(Hoopa Reservation)	128	4,948	994	20	5,962	6,090
	Subtotals	**303**	**22,458**	**6,733**	**225**	**29,415**	**29,718**
	Total in-river Harvest	**1,822**	**27,172**	**7,354**	**227**	**34,752**	**36,574**
	IN-RIVER RUN						
	Totals						2,377
	In-River Harvest and Escapement	10,143	184,684	29,741	484	214,910	225,053
	Angling Mortality (2% of harvest)	30	94	12	0	107	137
	Net Mortality (8% of harvest)	24	1,797	539	18	2,353	2,377
	Total In-river Run	**10,197**	**186,575**	**30,292**	**502**	**217,370**	**227,567**

1. Jacks determined as < 58 cm in fork length, adult proportions determined from scale analysis.
2. Calculated from total Willow Cr.Weir (ages determined from scales) minus TRH and TR recreational harvest.
3. IBSS = Surrogate based on returns to Iron Gate Hatchery, Bogus Creek, Scott R., Salmon R
4. TRBN = Surrogate based on Trinity River Basin Natural spawners
5. SSS = Surrogate based on unweighted average age structure from the Shasta, Scott, and Salmon Rivers.
6. Salmon = Surrogate based on Blue Creek jack proportions and Salmon River adult proportions.
7. LR Creel = Lower Klamath R. creel census, jacks from Megatable, adults from scale analysis.
8. UR Creel = Upper Klamath R. creel census, < 58 cm for jacks, scales for adults.
9. Jacks from Megatable, adults from scale analysis

Table 2. Age Composition proportions of the 2000 Klamath River fall chinook run. Adult proportions based on scale analysis, jack proportions on scale analysis or fork length cut off.

# of scales analyzed to determine proportions		AGE 2	3	4	5	Total
	SPAWNER ESCAPEMENT					
	Hatchery Spawners					
3,023	Iron Gate Hatchery (IGH)	1.16%	87.75%	10.91%	0.18%	100.00%
	Trinity River (TRH)	3.96%	88.91%	7.11%	0.02%	100.00%
	Subtotals	**1.92%**	**88.06%**	**9.88%**	**0.14%**	**100.00%**
	Natural Spawners					
	Trinity River basin (above Willow Creek, excluding TRH)	12.72%	75.89%	11.39%	0.00%	100.00%
124	Salmon River basin	12.87%	62.21%	23.73%	1.19%	100.00%
458	Scott River basin	8.38%	75.18%	16.44%	0.00%	100.00%
390	Shasta River Basin	10.33%	61.68%	27.99%	0.00%	100.00%
1,481	Bogus Creek Basin	1.07%	89.03%	9.67%	0.23%	100.00%
	Main Stem Klamath River (excluding IGH)	5.32%	78.21%	16.37%	0.10%	100.00%
	Trinity Tributaries above Reservation	12.73%	75.88%	11.39%	0.00%	100.00%
	Klamath Tributaries above Reservation	10.51%	66.37%	22.72%	0.40%	100.00%
	Hoopa Reservation Tributaries	12.63%	75.79%	11.58%	0.00%	100.00%
	Yurok Reservation Tributaries	16.40%	59.69%	22.77%	1.14%	100.00%
	Subtotals	**7.21%**	**78.54%**	**14.11%**	**0.14%**	**100.00%**
	Total Spawner Escapement	**4.41%**	**83.57%**	**11.88%**	**0.14%**	**100.00%**
	IN-RIVER HARVEST					
	Angler Harvest					
1,132	Klamath River (below Hwy 101 bridge)	8.32%	86.17%	5.42%	0.08%	100.00%
1,132	Klamath River (Hwy 101 to Coon Cr. Falls)	49.14%	47.80%	3.01%	0.05%	100.00%
212	Klamath River (Coon Cr. Falls to IGH)	7.01%	80.00%	12.99%	0.00%	100.00%
	Trinity River basin (above WCW)	8.95%	75.31%	15.74%	0.00%	100.00%
	Trinity River basin (below WCW)	30.27%	57.71%	12.02%	0.00%	100.00%
	Subtotals	**22.15%**	**68.76%**	**9.06%**	**0.03%**	**100.00%**
	Indian Net Harvest					
1,972	Klamath River(below Hwy 101)	0.20%	72.93%	26.05%	0.82%	100.00%
1,821	Klamath River(Hwy 101 to Trinity mouth)	2.21%	77.34%	19.47%	0.98%	100.00%
	Trinity River basin (below WCW)	2.10%	81.25%	16.32%	0.33%	100.00%
	Subtotals	**1.02%**	**75.57%**	**22.66%**	**0.76%**	**100.00%**
	Total in-river Harvest	**4.98%**	**74.29%**	**20.11%**	**0.62%**	**100.00%**
	IN-RIVER RUN					
	Totals					
	In-River Harvest and Escapement	4.51%	82.06%	13.22%	0.22%	100.00%
	Angling Mortality (2% of harvest)	22.15%	68.76%	9.06%	0.03%	100.00%
	Net Mortality (8% of harvest)	1.02%	75.57%	22.66%	0.76%	100.00%
	Total In-river Run	**4.48%**	**81.99%**	**13.31%**	**0.22%**	**100.00%**

Literature Cited

Kimura, D.K. and Chikuni, S. 1987. Mixtures of Empirical Distributions: An Iterative Application of the Age-Length Key. Biometrics 43, 23-35.

CDFG. 2001. Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-2000. Memo.